

IN THE CLAIMS

1. (currently amended): A combustible gas burner comprising:
- a main metal body open at a first base end, having a housing for a combustible gas distributor at a second base end and internally lined with a coating of refractory material, and having a volume inside said coating that defining a plenum,
 - an inner central lance for combustible gas arranged inside said main metal body,
 - at least two outer side lances for combustible gas which are disposed within said main metal body, said at least two outer side lances being arranged radially outwardly with respect to said inner central lance,
 - a single duct for the introduction of pre-heated air into said plenum where said single duct is connected to a side surface of said main metal body, said single duct being adapted to bring air into said plenum,
 - a gas distributor associated to said housing for distributing combustible gas to said inner central lance and to said outer side lances,
 - a combustible gas control system for said gas distributor,
 - a refractory unit associated with said first base end,
- characterized in that
- said gas burner comprises a series of nozzles situated in said refractory unit for the injection of the pre-heated air into a combustion chamber of an oven, said series of nozzles being in communication with said plenum, said nozzles being located between the inner central lance and the outer side

lances, and in that,

-said combustible gas distributor and control system comprises means for varying a distribution percentage of the combustible gas between the inner central lance and the outer side lances thereby continuously switching from a flame functioning mode of the burner, wherein the combustible gas is injected into said combustion chamber through said inner central lance alone, to a flameless functioning mode, wherein the combustible gas is injected to said inner central lance alone that wherein said refractory unit comprises a first region, a second region, a third region, which are concentric, said first region in turn comprising a series of calibrated holes and a central hole, having an inner surface from which the gas flows out and which houses a tip portion of said inner central lance where said tip portion has an external diameter, wherein said calibrated holes are positioned between said central hole and said nozzles, a free annular crown being defined between the inner surface of said central hole and the external diameter of said tip portion of the inner central lance said free annular crown being in communication with said plenum thereby allowing the passage of a sufficient quantity of pre-heated air suitable for preventing the overheating of the inner central lance.

2. (canceled)

3. (currently amended): The gas burner according to claim [[2]] 1, characterized in that said series of nozzles for the air is housed in the second region.

4. (currently amended): The gas burner according to claim [[2]] 1, characterized in that said series of nozzles comprises ten nozzles, and in that

said series of calibrated holes comprises three calibrated holes.

5.(currently amended): The gas burner according to claim [[2]] 1, characterized in that said first region comprises a cavity communicating with the combustion chamber and into which the air from the series of calibrated holes flows together with the combustible gas injected through the inner central lance .

6.(currently amended): The gas burner according to claim [[2]] 1, characterized in that the first region houses a flame detector in the housing and the ignition device situated in the housing of the burner.

7.(previously presented): The gas burner according to claim 3, characterized in that the holes of said series of calibrated holes are at an equal distance along a coaxial circumference with the inner central lance and lying on the bottom of the cavity of the first region.

8.(previously presented): The gas burner according to claim 1, characterized in that the nozzles of said series of nozzles are situated at an equal distance along a coaxial circumference with the inner central lance and lying on a base surface of the second region.

9. (previously presented): The gas burner according to claim 1, characterized in that said burner comprises at least two pass-through holes for housing said at least two outer side lances.

10.(previously presented): The gas burner according to claim 2, characterized in that said at least two pass-through holes are situated at an equal distance along a coaxial circumference with the inner central lance and lying on a base surface of the third region.

11.(previously presented):The gas burner according to claim 3, characterized in that said the total outflow section of air from the series of calibrated holes with respect to the total outflow section of air from the series of nozzles has a ratio ranging from 0.01 to 0.9.

12.(previously presented):The gas burner according to claim 11, characterized in that the total outflow section of air from the series of calibrated holes (16) with respect to the total outflow section of air from the series of nozzles has a ratio ranging from 0.05 to 0.5.

13.(previously presented):The gas burner according to claim 3, characterized in that once a ratio (x) has been defined, equal to the distance between the barycentre of a first hole of the series of calibrated holes and the barycentre of a second hole of the series of calibrated holes, divided by a minimum diameter selected from a hydraulic diameter of the first hole and a hydraulic diameter of the second hole, said ratio (x) is at least equal to 1.

14.(previously presented):The gas burner according to claim 13, characterized in that said ratio (x) is at least equal to 2.

15.(previously presented):The gas burner according to claim 1, characterized in that once a ratio (y) has been defined, equal to the distance between the barycentre of a first nozzle of the series of nozzles and the barycentre of a second nozzle of the series of nozzles, divided by a minimum diameter selected from an internal hydraulic diameter of the first nozzle and an internal hydraulic diameter of the second nozzle, said ratio (y) ranges from 1 to 10.

16.(previously presented):The gas burner according to claim 15, characterized in that said ratio (y) ranges from 2 to 5.

17.(previously presented):The gas burner according to claim 9, characterized in that once a ratio (z) has been defined, equal to the distance between the barycentre of a hole of said at least two holes and the barycentre of a nozzle of said series of nozzles, divided by a minimum diameter selected from a hydraulic diameter of the hole and an internal hydraulic diameter of the nozzle, said ratio (z) ranges from 1 to 50.

18. (previously presented): The gas burner according to claim 17, characterized in that said ratio (z) ranges from 3 to 30.

19. (previously presented): The gas burner according to claim 5, characterized in that said cavity has an outer diameter (Da2), an internal diameter (Da1) and a depth (La1), once a ratio (s) has been defined between the depth (La1) of the cavity and the internal diameter (Da1) of the same, said ratio (s) ranges from 0 to 5.

20.(previously presented): The gas burner according to claim 19, characterized in that the outer diameter (Da2) of said cavity is greater than the internal diameter (Da1) of the same.

21.(previously presented): The gas burner according to claim 19, characterized in that said ratio (s) ranges from 0 to 1.5.

22.(previously presented): The gas burner according to claim 1, characterized in that said main metal body further comprises an insulator made of fiber.

23.(previously presented): The gas burner according to claim 1, characterized in that said burner comprises at least two side protections for said at least two outer side lances for the combustible gas.

24.(previously presented):The gas burner according to claim 1, characterized

in that said protections are applied to the main metal body.

25. (previously presented): The gas burner according to claim 1, characterized in that said burner comprises a perforated flange for supporting said at least two outer side lances.

26. (currently amended): The gas burner according to claim ~~[[2]]~~ 1, characterized in that said central hole has a hydraulic diameter, said central inner lance having an outer diameter, having defined a ratio (k) between the hydraulic diameter of said central hole and the outer diameter of the lance (11), said ratio (k) ranges from 0.3 to 3.

27.(original): The gas burner according to claim 26, characterized in that said ratio (k) ranges from 0.5 to 1.5.

28-29. (canceled)

30. (currently amended): A combustible gas burner comprising:

- a main metal body open at a first base end, having a housing for a combustible gas distributor at a second base end and internally lined with a coating of refractory material, and having a volume inside said coating that defining a plenum,
- an inner central lance for combustible gas arranged inside said main metal body,
- at least two outer side lances for combustible gas which are disposed within said main metal body, said at least two outer side lances being arranged radially outwardly with respect to said inner central lance,
- a single duct for the introduction of pre-heated air into said plenum where said single duct is connected to a side surface of said main metal body, said

single duct being adapted to bring air into said plenum,

- a gas distributor associated to said housing for distributing combustible gas to said inner central lance and to said outer side lances,

- a combustible gas control system for said gas distributor,

- a refractory unit associated with said first base end,

characterized in that

- said refractory unit comprises, in sequence from the innermost to the outermost, a first region, a second annular region and a third annular region which are concentric to said inner central lance, wherein

- said first region comprising a central hole from which the combustible gas flows out and which houses a tip portion of said inner central lance and a series of calibrated holes communicating with said plenum and with a cavity that is defined in said first region and communicates with the combustion chamber of an oven, the pre-heated air from said series of calibrated holes flowing into said cavity together with the gas injected through said inner central lance said calibrated holes being positioned between said central hole and said nozzles,

- said second annular region comprising a series of nozzles communicating with said plenum for the injection of the pre-heated air into said combustion chamber of an oven and

- said third annular region comprising at least two pass-through holes for housing said at least two outer side lances

- both said series of calibrated holes and said series of nozzles being in communication with said plenum and being located between the inner central lance and the outer side lances, and in that,

-said combusttible gas distributor and control system comprise means for varying a distribution percentage of the combustible gas between the inner central lance and the outer side lances thereby continuously switching from a flame functioning mode of the burner, wherein the combustible gas is injected into said combustion chamber through said inner central lance alone, to a flameless functioning mode, wherein the combustible gas is injected to said inner central lance.

31.(currently amended) A combustible gas burner comprising:

- a main metal body open at a first base end, having a housing for a combustible gas distributor at a second base end and internally lined with a coating of refractory material, and having a volume inside said coating that defining a plenum,
- an inner central lance for combustible gas arranged inside said main metal body,
- at least two outer side lances for combustible gas which are disposed within said main metal body, said at least two outer side lances being arranged radially outwardly with respect to said inner central lance,
- a single duct for the introduction of pre-heated air into said plenum where said single duct is connected to a side surface of said main metal body, said single duct being adapted to bring air into said plenum,
- a gas distributor associated to said housing for distributing combustible gas to said inner central lance and to said outer side lances,
- a combustible gas control system for said gas distributor,
- a refractory unit associated with said first base end,

characterized in that

- said refractory unit comprises, in sequence from the innermost to the outermost, a first region, a second annular region and a third annular region which are concentric to said inner central lance, wherein

- said first region comprising a central hole from which the combustible gas flows out and which houses a tip portion of said inner central lance and a series of calibrated holes communicating with said plenum and with a cavity that is defined in said first region and communicates with the combustion chamber of an oven, the pre-heated air from said series of calibrated holes flowing into said cavity together with the gas injected through said inner central lance said calibrated holes being positioned between said central hole and said nozzles,

- said second annular region comprising a series of nozzles communicating with said plenum for the injection of the pre-heated air into said combustion chamber of an oven and

- said third annular region comprising at least two pass-through holes for housing said at least two outer side lances

- both said series of calibrated holes and said series of nozzles being in communication with said plenum and being located between the inner central lance and the outer side lances, and in that,

- said combustible gas distributor and control system comprise means for varying a distribution percentage of the combustible gas between the inner central lance and the outer side lances,

- activation means of said control system being provided to thereby continuously switching from a flame functioning mode of the burner,

wherein the combustible gas is injected into said combustion chamber through said inner central lance alone, to a flameless functioning mode, wherein the combustible gas is injected to said inner central lance alone.

32.(currently amended): A combustible gas burner comprising:

- a main metal body open at a first base end, having a housing for a combustible gas distributor at a second base end and internally lined with a coating of refractory material, and having a volume inside said coating that defining a plenum,
 - an inner central lance for combustible gas arranged inside said main metal body,
 - at least two outer side lances for combustible gas which are disposed within said main metal body, said at least two outer side lances being arranged radially outwardly with respect to said inner central lance,
 - a single duct for the introduction of pre-heated air into said plenum where said single duct is connected to a side surface of said main metal body, said single duct being adapted to bring air into said plenum,
 - a gas distributor associated to said housing for distributing combustible gas to said inner central lance and to said outer side lances,
 - a combustible gas control system for said gas distributor,
 - a refractory unit associated with said first base end,
- characterized in that
- said refractory unit comprises, in sequence from the innermost to the outermost, a first region, a second annular region and a third annular region which are concentric to said inner central lance, wherein

-said first region comprising a central hole from which the combustible gas flows out and which houses a tip portion of said inner central lance, a series of calibrated holes communicating with said plenum and with a cavity that is defined in said first region and communicates with the combustion chamber of an oven, the pre-heated air from said series of calibrated holes flowing into said cavity together with the gas injected through said inner central lance, a housing that houses an ignition device and a housing that houses a flame detector device said calibrated holes being positioned between said central hole and said nozzles;

-said second annular region comprising a series of nozzles communicating with said plenum for the injection of the pre-heated air into said combustion chamber of an oven and

- said third annular region comprising at least two pass-through holes for housing said at least two outer side lances

- both said series of calibrated holes and said series of nozzles being in communication with said plenum and being located between the inner central lance and the outer side lances, and in that,

-said combustible gas distributor and control system comprise means for varying a distribution percentage of the combustible gas between the inner central lance and the outer side lances,

- activation means of said control system being provided to thereby continuously switching from a flame functioning mode of the burner, wherein the combustible gas is injected into said combustion chamber through said inner central lance alone and the combustion of said combustible gas with the pre-heated air drawn through said series of

calibrated holes takes place in a flame mode, upon ignition of said ignition device, to a flameless functioning mode, wherein, at a temperature above the self-ignition device of the gas in air the combustible gas is injected to said inner central lance alone and the combustion of said gas with the pre-heated air drawn through said series of calibrated holes and said series of nozzles takes place in a flameless mod inside said combustion chamber.